

※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

1. (40 %) Please explain the following terms:
 - (a) shear thinning
 - (b) radius of gyration
 - (c) θ solvent
 - (d) Williams-Landel-Ferry equation
 - (e) alloy
 - (f) precipitation hardening
 - (g) corrosion
 - (h) casting
2. (15 %) What is glass transition temperature (T_g)? Is T_g a first order or second order transition? Why? How to measure T_g ?
3. (5 %) Draw the crystal planes that have Miller index (2 1 1) in a cubic unit cell.
4. (20 %) What are the characteristics of eco-friendly materials? Please give two examples. How can eco-friendly materials be applied?
5. (10 %) The densities of crystalline and amorphous polyethylene (PE) are around 1020 kg/m^3 and 895 kg/m^3 , respectively. Please calculate the weight fraction of crystalline region for two samples of linear PE and branched PE, which have average density equal to 980 kg/m^3 and 927 kg/m^3 , respectively. Why do the two samples have considerably different crystallinity values?
6. (10 %) A flat-plate X-ray diffraction pattern was obtained from an unoriented polymer sample using $\text{CuK}\alpha$ radiation. It consisted of three rings of radius 11.8 mm, 13.3 mm, 22.0 mm. The sample-to-detector distance was found to be 30 mm. Please calculate the inter-planar spacings of the crystalline planes giving rise to these diffractions.

試題隨卷繳回